CLAIMS

A method of generating information about particulates present in a fluid, 1. 1 comprising: 2 filtering the fluid through a substrate, the particulates being retained on the 3 substrate during the filtering; after the filtering, scanning across at least a portion of the substrate with a 5 microscope, the scanning comprising automated displacement of the substrate 6 relative to an observing portion of the microscope along a pattern, the microscope obtaining data about said particulates at locations along the pattern; and 9 digital image processing of the data obtained by the microscope to generate 10 there see than the their information about said/particulates. 11 The method of claim 1 wherein the fluid is a liquid. 2. 1 The method of claim 1 wherein the fluid is a gas. 3. 1 (fi The method of claim 1 wherein the generated information is information about ĻŊ 4. 1 1 one or more of the size, quantity and shape of the particulates. ij 2 The method of claim 1 wherein the generated information is information about 5. 1 a type of the particulates: 2 The method of claim 1 further comprising: 6. 1 determining a relative contrast of two or more of the particulates; and 2 sorting the particulates amongst two or more types based upon the relative 3 contrast. 4 30-5074 (4015) 23 p05

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7. The method of claim 6 wherein the determining a relative contrast of the
particles comprises one or more of determining: (1) contrast of the particles relative
to a background defined by the substrate, (2) color of the particles, (3) fluorescence
of the particles, (4) response of the particles to electrons, (5) response of the
particles to photons, (6) response of the particles to x-rays, and (7) response of the
particles to particle beams.
8. The method of claim 1 wherein the microscope is a light microscope, and
further comprising sorting the retained particulates into a group which appears
darker than the substrate in the obtained data and another group which appears
lighter than the substrate in the obtained data.
9. A method of generating information about materials present in a composition,
comprising:
utilizing a reagent to dissolve at least a portion of the composition and
thereby form a mixture;
filtering the mixture through a substrate, at least some components of the
mixture being retained on the substrate during the filtering;
after the filtering, scanning across at least a portion of the substrate with a
microscope to obtain one or more images of the substrate; and
digital image processing of the one or more images to generate information
about said retained components.
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10. The method of claim 9 wherein the generated information is information about one or more of the size, type, quantity and shape of the retained components.

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1	11. The method of claim 9 wherein the mixture comprises an emulsion of silicon,
2	dissolved metal, and non-dissolved particulates; and wherein the silicon is passed
3	through the substrate while at least some of the non-dissolved particulates are
4	retained on the substrate as said components.
1	12. The method of claim 9 further comprising sorting the retained components by
2	one or more of: (1) contrast relative to a background defined by the substrate, (2)
3	color, (3) fluorescence, (4) response to electrons, (5) response to photons, (6)
4	response to x-rays, and (7) response to particle beams.
1	13. The method of claim 9 wherein the microscope is a light microscope, and
2	further comprising sorting the retained components amongst a first group which
3	appears darker than the substrate in the obtained images and a second group which
4	appears lighter than the substrate in the obtained images.
1	14. A method of generating information about materials present in a composition,
2	comprising:
3	utilizing a reagent to disperse at least a portion of the composition and
4	thereby form a dispersion of undissolved material in a solution;
5	filtering the dispersion through a substrate, at least some of the undissolved
6	material being retained on the substrate during the filtering;

	7	after the filtering, scanning across at least a portion of the substrate with a
	8	microscope, the scanning comprising automated displacement of the substrate
	9	relative to an observing portion of the microscope along a grid pattern, the
	10	microscope obtaining data about said retained undissolved material at locations
$\mathcal{N}_{\mathcal{A}}$	11	along the grid pattern; and
3/5) \	12	processing the data obtained by the microscope to generate information
	13 .	about one or more of the size, shape, type and quantity of the undissolved
	14	material.
°Ю-	1 ¹	15. The method of claim 14 wherein the generated information is information
202	2	about one or more of the size, type, quantity and shape of the undissolved material.
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The House	· 1	16. The method of claim 14 wherein the composition is a portion of a sputtering
	2	target.
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45 4	1	17. The method of claim 14 wherein the processing calculates a concentration of
. 	2	the undissolved material in the composition.
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	1	18. The method of claim 14 wherein the undissolved material comprises one or
30	2	more oxides, and wherein the processing calculates the concentration of oxides in
	3	the composition.
	1	19. The method of claim 14 wherein the undissolved material comprises aluminum
	2	oxide, and wherein the processing calculates the concentration of aluminum oxide
	3	in the composition.
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	1	20. The method of claim 14 wherein the undissolved material comprises carbon,
	2	and wherein the processing calculates a concentration of carbon in the original
	3	composition.
	1	21. The method of claim 14 wherein the dispersion comprises non-dissolved
	2	particulates and silicon in the solution; wherein the solution comprises dissolved
	3	metal; and wherein the silicon is passed through the substrate while at least some of
10	1 4	the non-dissolved particulates are retained on the substrate as said retained
200	5	undissolved material.
Harris	1	22. The method of claim 14 wherein the processing comprises digital image
And the second	2	processing.
לוחים איים והיים איים איים איים איים איים איים איים	1	23. The method of claim 14 wherein the solution comprises one or more metals;
	2	and wherein the retained undissolved material comprises one or more oxides.
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Hart gree with deep deep de	1	24. The method of claim 14 wherein the solution comprises one or more metals;
	2	and wherein the retained undissolved material comprises carbon.
		,
	1	25. The method of claim 14 wherein the solution comprises one or more of
	2	aluminum, copper, lead, antimony and silicon.
Ŋ	1 1	26. The method of claim 14 wherein the solution comprises one or more metals,
ch'	\mathcal{F}^{2}	the only metals in the solution being selected from the group consisting of one or
	3	more of aluminum, copper, lead, and antimony.

	1	27. The method of claim 14 wherein the solution comprises aluminum.
	1	28. The method of claim 14 wherein the solution comprises aluminum and copper.
	1 2	29. The method of claim 14 wherein the only metals in the solution are selected from the group consisting of one or both of aluminum and copper.
200	1	30. The method of claim 14 wherein the solution comprises copper.
~ (G	1	31. The method of claim 14 wherein the solution comprises copper and silver.
17.00 June 18.00 St.	1	32. The method of claim 14 wherein the solution comprises lead.
وسال البيدا البيد والبيدا والبيد والبيدا	1	33. The method of claim 14 wherein the microscope is a light microscope.
10 Annual 10 Ann	1	34. The method of claim 14 wherein the microscope is an electron microscope.
der gene gene gene gene gene gene gene ge	1 2	35. A method of generating information about materials present in a composition, comprising:
Ship.) 3	selectively dissolving some components of the composition in a reagent
	4 5	while leaving other components undissolved; collecting at least some of the undissolved components on a filter surface;

	6	scanning across at least a portion of the litter surface with a light
	7	microscope, the scanning comprising automated displacement of the filter
	8	surface relative to an observing portion of the microscope along a grid pattern,
	9	the microscope obtaining data about scattering of light by the undissolved
	10	components on the filter surface, the undissolved components comprising at
	11	least two types, a first of the two types being darker than a background defined
	12	by the filter surface and a second of the two types being lighter than the
_ //	13	background; and
Sh	\14	digital image processing of the data obtained by the microscope to generate
70	15	information about one or more of the size, quantity and aspect ratio of the
/ []	16	undissolved components; the processing comprising a sort of the undissolved
ياسي حي مسي سي سي يسي بيسي بيسي بيسي البيا البيا التس البيا البين البيد البيا البيا	17	components amongst the two types.
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III	1	36. The method of claim 35 wherein the composition is a metal having inclusions
10 mm 4 mm	2	dispersed therein; wherein the dissolved components of the composition comprise
81 14 14 16 18 18 18 18 18 18 18 18 18 18 18 18 18	3	the metal; and wherein the undissolved components comprise the inclusions.
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Hard day of Hard day of the Hard	1	37. The method of claim 35 further comprising displaying results of the processing
	2	as a histogram showing undissolved components by one or more of type, size and
	3	aspect ratio.
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	1	38. The method of claim 35 wherein the dissolved components of the composition
	2	comprise one or more metals; and wherein the undissolved components comprise
	3	one or more oxides.
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1	39. The method of claim 35 wherein the first type of undissolved components
2	predominately comprise carbon and wherein the second type of the undissolved
3	components predominately comprise one or more oxides.
	;
1	40. A method of generating information about impurities present in a metal
2	composition, comprising:
3	utilizing a reagent to selectively dissolve a portion of the composition
4	relative to at least some impurities present in the metal composition, the
5	dissolved portion forming a solution with the reagent; the impurities being at
6	least two different types; one of the at least two types being a first type and
7	another of the at least two types being a second type;
8	filtering the solution through a substrate, at some of the first and second
9	types of the impurities being retained on the substrate during the filtering;
10	after the filtering, scanning across at least a portion of the substrate with a
11	light microscope, the scanning comprising automated displacement of the
12	substrate relative to an observing portion of the microscope along a grid pattern
13	the microscope obtaining data about the impurities at locations along the grid
14	pattern, the data including a relative darkness of the impurities relative to a
15	background defined by the substrate; the first type of impurities being darker
16	than the background and the second type of impurities being lighter than the
17	background; and
18	processing the data obtained by the microscope to generate information
19	about the size, quantity and type of the impurities.

41. The method of claim 40 further comprising displaying results of the processing as a histogram showing impurities by one or more of type, size and quantity.

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1	42.	The method of claim 40 wherein the processing of the data obtained by the
2	mic	roscope comprises digital image processing.
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1	43.	The method of claim 40 wherein the dissolved portion of the metal
2	con	and copper, and wherein the reagent
3	is a	n acid comprising a mixture of hydrochloric acid and nitric acid.
1	44.	The method of claim 40 wherein the first type of impurities predominately
2	cor	nprise carbon and wherein the second type of impurities predominately
3	cor	nprise one or more oxides.
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1	45.	A method of generating information about impurities present in a metal
2	coı	mposition, comprising:
3		utilizing a reagent to selectively dissolve portions of the composition
4		relative to at least some impurities present in the metal composition, the
5	•	dissolved portions forming a solution with the reagent;
6		filtering the solution through a substrate, at least a portion of the impurities
7		being retained on the substrate during the filtering;
8		after the filtering, mounting the substrate to a holder and scanning across at
9		least a portion of the substrate with a microscope, the scanning comprising one
10		or both of an actuated holder and an actuated microscope lens mounted to
11		automate displacement of the substrate relative to the microscope lens along a
12		grid pattern, the microscope obtaining data about the impurities at locations
13		along the grid pattern; and

	14 ~	digitally analyzing the data obtained by the microscope to generate
	15	information about the size and quantity of the impurities.
		45 the research is an acid comprising a mixture of
	1	46. The method of claim 45 wherein the reagent is an acid comprising a mixture of
	2	hydrochloric acid and nitric acid
	1	47. The method of claim 45 wherein the substrate defines a background against
	2	which a first type of impurity is darker and a second type of impurity is lighter, and
	3	further comprising distinguishing the first and second types of impurities from one
	4	another during the analyzing.
1	1	48. The method of claim 45 wherein the impurities comprise a first type of
	2	impurity and a second type of impurity which is different than the first type of
	3	impurity, and wherein the data obtained by the microscope is utilized to distinguish
الميا البيا البين الميا البيا	4	the first and second types of impurities from one another during the analyzing.
	$\left(\begin{array}{c} 1 \\ 1 \end{array} \right)^{1}$	49. The method of claim 48 further comprising modifying at least one of the first
) 2	and second impurities after utilizing the reagent and prior to the scanning.
	1	50. A method of generating information about different types of impurities present
	2	in a metal composition, comprising:
	3	providing the metal composition as a block having a first outer surface;
	4	etching the metal composition block with a first acid solution to remove the
	5	first outer surface and expose a second outer surface;

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after the etching, dissolving metallic po	ortions of the composition in a
second acid solution while leaving at least so	some non-metallic impurities no
dissolved;	

filtering the second acid solution through a substrate, at least some of the non-dissolved non-metallic impurities being retained on the substrate during the filtering, the filtering comprising flowing the solution through at least part of the substrate to form a flow pattern on the substrate;

sub-dividing the flow pattern into a grid pattern, the grid pattern defining points at which a light microscope will scan a surface of the flow pattern, the grid pattern defining a sufficient number of points for the microscope to scan at least 5% of the flow pattern surface;

after the filtering, scanning across at least a portion of the substrate with the light microscope, the scanning comprising automated displacement of the substrate relative to a lens of the microscope along the grid pattern, the microscope obtaining data about the impurities at the points along the grid pattern; and

digitally analyzing the data obtained by the microscope to generate information about the size, quantity and type of the impurities.

- 51. The method of claim 50 wherein the substrate comprises a predominate pore size of less than or equal to 0.4 microns.
- 52. The method of claim 50 wherein the metallic portions of the composition comprise aluminum and copper, and wherein the first acid solution comprises hydrochloric acid and nitric acid.

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1	53. The method of claim 50 wherein the metallic portions of the composition
2	comprise aluminum and copper, and wherein the second acid solution comprises
3	hydrochloric acid and nitric acid.
1	54. The method of claim 50 wherein the substrate defines a background against
2	which a first type of impurity is darker and a second type of impurity is lighter, and
3	further comprising distinguishing the first and second types of impurities from one
1	another during the analyzing.
1	55. The method of claim 50 wherein the metal composition block is obtained from
2	a cast material.
1	56. The method of claim 50 wherein the metal composition block is obtained from
2	a sputtering target.
1	57. The method of claim 50 wherein the metal composition block is obtained from
2	a solder.
1	58. The method of claim 50 wherein the flow pattern has a substantially circular
2	outer periphery, and wherein the grid pattern substrate has a substantially octagonal
3	outer periphery.